Claims

[c1] A method for, in the heating of a workpiece, inhibiting contamination of the workpiece by a contaminant, said method comprising: placing the workpiece in a first container; flushing said first container and then filling said first container with a protective gas; and placing said first container in a second container and evacuating said second container, and consequently said first container placed therein, thereby creating a vacuum inside said first and second containers and reducing the partial pressure for a contaminant-of-interest present in said first container before the workpiece is heat treated.

[c2] The method as recited in claim 1, further comprising: heat treating the workpiece, and during said heat treatment, inhibiting transport of the contaminant-of-interest from said second container to said first container by causing the contaminant-of-interest to pass through a duct between the first and second containers.

[c3] The method as recited in claim 2, wherein said duct has a cross section possessing at least one dimension having an extent in the same order of magnitude as the mean free path which the contaminant-of-interest has in the atmosphere prevailing in the duct during the heat treatment.

[c4] The method as recited in claim 2, wherein said duct has a cross section possessing at least one dimension having an extent less than the mean free path which the contaminant-of-interest has in the atmosphere prevailing in the duct during the heat treatment.

[c5] The method as recited in claim 2, wherein said duct has a cross section possessing a longitudinal dimension having an extent that is multiply times

greater than an extent of at least one cross-sectional dimension of the duct.

[c6] The method as recited in claim 5, wherein said duct has a cross section possessing a longitudinal dimension having an extent that is at least ten times greater than an extent of at least one cross-sectional dimension of the duct.

[c7] The method as recited in claim 5, wherein said duct has a cross section possessing a longitudinal dimension having an extent that is at least fifty times greater than an extent of at least one cross-sectional dimension of the duct.

[c8] The method as recited in claim 5, wherein said duct has a cross section possessing a longitudinal dimension having an extent that is at least one hundred times greater than an extent of at least one cross-sectional dimension of the duct.

[c9] The method as recited in claim 2, wherein said first container has a volume that is less than twenty times greater than a volume of said duct.

[c10] The method as recited in claim 2, wherein said first container has a volume that is less than fifteen times greater than a volume of said duct.

[c11] The method as recited in claim 2, wherein said first container has a volume that is less than ten times greater than a volume of said duct.

[c12] The method as recited in claim 1, further comprising: opening a valve between said first and second containers during evacuation thereof and thereby establishing an atmospheric connection therebetween, and subsequently closing said valve when evacuation is completed.

[c13] The method as recited in claim 1, further comprising: heat treating the

workpiece, and during said heat treatment, opening a valve between the first and second containers when at least one of (1) the pressure in said second container exceeds a predetermined value and (2) a pressure difference between said first and second containers exceeds a predetermined value, thereby inhibit compression of said first container.

[c14] The method as recited in claim 1, wherein the first container is filled with the protective gas before being placed in said second container.

[c15] The method as recited in claim 1, further comprising: placing piece goods in said first container thereby providing surfaces that capture contaminant-of-interest by way of a reaction therewith.

[c16] The method as recited in claim 15, further comprising: locating said piece goods in a first chamber of the first container separate from the workpiece positioned in a second chamber of the first container, said first chamber being in open fluid communication with said second chamber.

[c17] The method as recited in claim 15, wherein said piece goods are located in said duct thereby creating surfaces for the capture of the contaminant-of-interest by surface reaction therewith.

[c18] The method as recited in claim 1, wherein the workpiece is heated for subsequent soldering.

[c19] A device for inhibiting contamination of a workpiece by a contaminant-of-interest during a heat treatment of the workpiece, said device comprising: a first container adapted to accommodate a workpiece for heat treatment therein, said first container configured for placement in a second container when the workpiece is being heat treated; and said first container including

a first means for introducing a protective gas and a second means for establishing an atmospheric connection between said first container and said second container and so that evacuation of the second container, together with the first container, creates a vacuum inside said first and second containers thereby reducing the partial pressure for the contaminant-of-interest in the first container before the workpiece is heat treated.

[c20] The device as recited in claim 19, wherein said means for establishing an atmospheric connection between said first container and said second container is a duct.

[c21] The device as recited in claim 20, wherein said duct has a cross section possessing at least one dimension having an extent in the same order of magnitude as the mean free path which the contaminant-of-interest has in the atmosphere prevailing in the duct during the heat treatment.

[c22] The device as recited in claim 20, wherein said duct has a cross section possessing at least one dimension having an extent less than the mean free path which the contaminant-of-interest has in the atmosphere prevailing in the duct during the heat treatment.

[c23] The device as recited in claim 20, wherein said duct has a cross section possessing a longitudinal dimension having an extent that is multiply times greater than an extent of at least one cross-sectional dimension of the duct.

[c24] The device as recited in claim 23, wherein said duct has a cross section possessing a longitudinal dimension having an extent that is at least ten times greater than an extent of at least one cross-sectional dimension of the duct.

[c25] The device as recited in claim 23, wherein said duct has a cross section possessing a longitudinal dimension having an extent that is at least fifty times greater than an extent of at least one cross-sectional dimension of the duct.

[c26] The device as recited in claim 23, wherein said duct has a cross section possessing a longitudinal dimension having an extent that is at least one hundred times greater than an extent of at least one cross-sectional dimension of the duct.

[c27] The device as recited in claim 20, wherein said first container has a volume that is less than twenty times greater than a volume of said duct.

[c28] The device as recited in claim 20, wherein said first container has a volume that is less than fifteen times greater than a volume of said duct.

[c29] The device as recited in claim 20, wherein said first container has a volume that is less than ten times greater than a volume of said duct.

[c30] The device as recited in claim 19, further comprising: a valve disposed in the first container for, in the evacuation of the first and the second container, establishing an atmospheric connection between the first container and the second container.

[c31] The device as recited in claim 19, further comprising: a valve disposed in the first container to establish an atmospheric connection between the first container and the second container and thereby inhibit compression of the first container as the workpiece is heated upon the occurrence of at least one of (1) a total pressure in the second container exceeding a predetermined value and (2) a pressure difference between the first and

second container exceeding a predetermined value.

[c32] The device as recited in claim 19, further comprising: piece goods selected for providing surfaces for the capture of the contaminant-of-interest by a reaction between the contaminant-of-interest and surfaces of said piece goods.

[c33] The device as recited in claim 32, wherein said piece goods are disposed inside the first container.

[c34] The device as recited in claim 33, further comprising: a means for dividing the first container into a first chamber and a second chamber, said first chamber configured for placement of said piece goods therein so that when the first chamber and the second chamber are in mutual atmospheric connection, said piece goods are separated from a workpiece located in the second chamber.

[c35] The device as recited in claim 20, wherein in said piece goods are disposed in said duct.

[c36] The device as recited in claim 20, wherein said first container comprises a box and a lid disposed on the box such that the duct is formed between the lid and the box.

[c37] The device as recited in claim 20, wherein said duct is configured as an elongated column.

[c38] The device as recited in claim 20, wherein said duct is configured as an elongated, serpentine loop.

[c39] The device as recited in claim 19, wherein said first means is a valve for introducing a protective gas to the first container.

[c40] The device as recited in claim 19, wherein said second container is an oven.